



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/025,399	12/17/2001	Ai Quoc Pham	IL-10824	4886

7590

10/17/2005

Ann M. Lee  
Agent for Applicants  
Lawrence Livermore National Laboratory  
P.O. Box 808,L-703  
Livermore, CA 94551

EXAMINER
----------

CANTELMO, GREGG

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 10/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/025,399	Applicant(s) PHAM ET AL.	
	Examiner Gregg Cantelmo	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4,6,7 and 12-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6,7 and 12-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. In response to the amendment received July 29, 2005:
  - a. Claims 1-4, 6-7 and 12-20 are pending. Note that the first sentence of Applicant's remarks on page 5 lists claim 11 as pending, however this claim has in fact been cancelled;
  - b. The 112 1<sup>st</sup> and 2<sup>nd</sup> rejections set forth in the previous office action have been withdrawn in light of the amendments to the claims;
  - c. The prior art rejections of record are withdrawn in light of the amendment.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, as amended requires that the cathode include at least one cobalt iron manganese based material. Claim 7 defines a genus of cathode materials which define cathode materials which exclude the requisite materials of claim 1 (for example (La,Sr)(Co,Fe)O<sub>3</sub> of claim 7). Applicant is advised to amend claim 7 to exclude this species. This also applies to claim 19, dependent upon claim 12.

### ***Claim Rejections - 35 USC § 103***

Art Unit: 1745

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 6-7 and 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mogensen of record in view of EP '356, Kuo and Weber, previously of record, and A.Q. Pham, et al. "Colloidal Spray Deposition Technique for the Processing of Thin Film Solid Oxide Fuel Cells" UCRL-JC-135760, (hereinafter referred to as Pham-1999).

Mogensen discloses a solid oxide fuel cell (SOFC), comprising an anode including doped ceria, and electrolyte and a cathode (abstract and col. 3, line 9 through col. 4, line 4 as applied to claim 1).

The anode is composed of NiO/doped ceria (col. 2, ll. 19-52 as applied to claim 2).

The doping material in the ceria can be gadolinium oxide, lanthanide oxide and yttria oxide (col. 4, ll. 1-3 as applied to claim 3).

The electrodes and electrolyte are inherently porous. The electrodes must be porous to permit reactant gases (oxidant and fuel) to flow through the electrodes and the electrolyte must be inherently porous to permit ionic conductivity through the electrolyte (as applied to claim 4).

The differences between the instant claims and Mogensen are that Mogensen does not teach of the electrolyte containing doped-ceria (claims 1 and 6) or of the

Art Unit: 1745

cathode containing a cobalt iron manganese based material (claims 1 and 7) and more particularly a cathode material of  $(\text{La}, \text{Ca}(\text{Co}, \text{Fe}, \text{Mn})\text{O}_3)$  (claim 7) of the fuel cell operating at a temperature in the range of 400-700° C (claim 1) of the doped-ceria comprising doped-ceria formed from a process of colloid spray deposition or aerosol spray casting (claim 1).

With respect to the electrolyte containing doped ceria (claims 1 and 6):

The electrolyte of Mogensen is YSZ (yttria stabilized zirconia).

EP '356 discloses that doped ceria electrolytes ( $\text{CeO}_2$  doped with materials such as  $\text{CaO}$  or  $\text{Gd}_2\text{O}_3$ ) compared to zirconia based electrolytes are preferable since they exhibit higher conductivity than the zirconia based electrolytes and can be operated at lower temperatures (page 3, ll. 42-45).

The motivation for using doped-ceria electrolyte is that it would have improved the conductivity of the electrolyte and further reduced the operating temperature of the SOFC.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by using doped-ceria electrolyte since it would have improved the conductivity of the electrolyte and further reduced the operating temperature of the SOFC.

With respect to the cathode containing cobalt iron manganese based material (claims 1 and 7):

The cathode material is desirably a perovskite structure ( $ABO_3$ ). It is well known in the art to provide air electrodes (cathodes) having a perovskite-like crystal structure of the formula  $ABO_3$ , wherein the A-site comprises a combination of a mixed lanthanide and multiple A-site dopants, and the B-site comprises a combination of Mn and at least one B-site dopant. The mixed lanthanide preferably comprises La, Ce, Pr and, optionally, Nd. The A-site dopants include at least one rare earth element selected from La, Ce, Pr, Nd, Sm, Eu and Gd, and at least one alkaline earth element selected from Ca, Sr and Ba. The B-site dopant is selected from Mg, Al, Cr, Ni, Co, Fe and combinations thereof (see abstract and col. 2, ll. 50-61 of Kuo). Weber further teaches that the perovskite cathode material is selected from combinations of A-site dopants of (La, Sr, Ca) and combinations of B-site dopants of (Cr, Mn, Fe, Co, Ni) (page 5) and that the particular dopant combinations can be adjusted and varied to optimize the thermal coefficient of expansion resulting in delamination at the cathode/electrolyte interface.

Any combination of these materials would have been obvious to one of ordinary skill in the art to while providing a cathode having a coefficient of thermal expansion which closely matches the other components of the fuel cell and decreasing the internal resistance of the fuel cell.

The motivation for using a cathode of La-Sr-Co-Fe-Mn-Oa in a fuel cell is that it would have provided an air cathode of a perovskite crystal structure which decreases the internal resistance of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by selecting the

Art Unit: 1745

cathode material to be La-Sr-Co-Fe-Mn-Oa in a fuel cell since it would have provided a cathode material having coefficient of thermal expansion which closely matches the other components of the fuel cell decreased the internal resistance of the fuel cell. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP 2144.07.

With respect to the doped-ceria being formed from colloidal spray deposition or aerosol spray casting (claim 1):

Newly Cited Pham-1999 discloses forming ceramic materials for fuel cell components wherein the process employs colloidal spray deposition techniques (abstract).

The motivation for using a colloidal spray technique is that it improves the density of the films and provides films free of cracks.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by depositing the ceramic films by colloidal spray deposition since it would have improved the film density and generated crack-free films.

With respect to the operating temperature of claim 1:

As discussed above, EP '356 discloses that the use of doped-ceria electrolytes provide much higher conductivity than zirconia based electrolytes. Thus there is ample motivation for replacing the zirconia electrolyte of Mogensen with a doped-ceria electrolyte to provide an electrolyte having a higher conductivity at lower operational temperatures. The combination of the teachings as set forth above teach all of the same components as recited in claim 1. Since the components are the same, there is a reasonable expectation of success that the fuel cell described above would effectively operate at an operational temperature of 550° C and achieve the same power outputs, absent clear evidence to the contrary. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114, incorporated herein.

"[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. *In re Fitzgerald*, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially



Art Unit: 1745

identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

“When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.” In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. In re Best, 562 F.2d at 1255, 195 USPQ at 433. See also Titanium Metals Corp. v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See also In re Ludtke, 441 F.2d 660, 169 USPQ 563 (CCPA 1971); Northam Warren Corp. v. D. F. Newfield Co., 7 F. Supp. 773, 22 USPQ 313 (E.D.N.Y. 1934). See MPEP § 2112.01.

There is a reasonable expectation that the fuel cell, obviated by the combination of references set forth above will effectively operate within the claimed temperature range.

With respect to claims 12-17:

Mogensen discloses a solid oxide fuel cell (SOFC), comprising an anode including doped ceria (abstract and col. 3, line 9 through col. 4, line 4) and a methane fuel (col. 2, ll. 56 as applied to claim 12).

The fuel source of Mogensen can be either hydrogen or methane. The operating temperature of claim 14 does not further limit the SOFC fuel cell system and is not accorded patentable weight since it is an intended operational use of the fuel cell of

Art Unit: 1745

claim 14 (col. 2, ll. 54-57 as applied to claim 14). A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114, incorporated herein.

The anode is composed of NiO/doped ceria (col. 2, ll. 19-52 as applied to claim 17).

The differences between the instant claims and Mogensen are that Mogensen does not teach of the electrolyte containing doped-ceria (claim 12) or of the cathode containing a cobalt iron manganese based material (claim 12), of the fuel cell operating in a temperature range of 400-700° C (claim 13), operating the cell at about 550° C (claim 14), of operating the of the fuel being hydrogen and a power output of up to 400 mW/cm<sup>2</sup> is produced at an operating temperature of 550° C (claim 15), of the fuel being methane and wherein a power output of 320 mW/cm<sup>2</sup> is produced at an operating temperature of 550° C (claim 16).

With respect to an electrolyte containing doped ceria (claim 12):

The electrolyte of Mogensen is YSZ (yttria stabilized zirconia).

EP '356 discloses that doped ceria electrolytes (CeO<sub>2</sub> doped with materials such as CaO or Gd<sub>2</sub>O<sub>3</sub>) compared to zirconia based electrolytes are preferable since the exhibit higher conductivity than the zirconia based electrolytes and can be operated at lower temperatures (page 3, ll. 42-45).

Art Unit: 1745

The motivation for using doped-ceria electrolyte is that it would have improved the conductivity of the electrolyte and further reduced the operating temperature of the SOFC.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by using doped-ceria electrolyte since it would have improved the conductivity of the electrolyte and further reduced the operating temperature of the SOFC.

With respect to the cathode containing cobalt iron manganese based material (claim 12):

The cathode material is desirably a perovskite structure ( $ABO_3$ ). It is well known in the art to provide air electrodes (cathodes) having a perovskite-like crystal structure of the formula  $ABO_3$ , wherein the A-site comprises a combination of a mixed lanthanide and multiple A-site dopants, and the B-site comprises a combination of Mn and at least one B-site dopant. The mixed lanthanide preferably comprises La, Ce, Pr and, optionally, Nd. The A-site dopants include at least one rare earth element selected from La, Ce, Pr, Nd, Sm, Eu and Gd, and at least one alkaline earth element selected from Ca, Sr and Ba. The B-site dopant is selected from Mg, Al, Cr, Ni, Co, Fe and combinations thereof (see abstract and col. 2, ll. 50-61 of Kuo). Weber further teaches that the perovskite cathode material is selected from combinations of A-site dopants of (La, Sr, Ca) and combinations of B-site dopants of (Cr, Mn, Fe, Co, Ni) (page 5) and that

Art Unit: 1745

the particular dopant combinations can be adjusted and varied to optimize the thermal coefficient of expansion resulting in delamination at the cathode/electrolyte interface.

Any combination of these materials would have been obvious to one of ordinary skill in the art to while providing a cathode having a coefficient of thermal expansion which closely matches the other components of the fuel cell and decreasing the internal resistance of the fuel cell.

The motivation for using a cathode of La-Sr-Co-Fe-Mn-Oa in a fuel cell is that it would have provided an air cathode of a perovskite crystal structure which decreases the internal resistance of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by selecting the cathode material to be La-Sr-Co-Fe-Mn-Oa in a fuel cell since it would have provided a cathode material having coefficient of thermal expansion which closely matches the other components of the fuel cell decreased the internal resistance of the fuel cell. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP j 2144.07.

With respect to the operating temperature of claims 13-16:

As discussed above, EP '356 discloses that the use of doped-ceria electrolytes provide much higher conductivity than zirconia based electrolytes. Thus there is ample

Art Unit: 1745

motivation for replacing the zirconia electrolyte of Mogensen with a doped-ceria electrolyte to provide an electrolyte having a higher conductivity at lower operational temperatures. The combination of the teachings as set forth above teach all of the same components as recited in claims 13-16. Since the components are the same, there is a reasonable expectation of success that the fuel cell described above would effectively operate at an operational temperature of 550° C and achieve the same power outputs, absent clear evidence to the contrary. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114, incorporated herein.

"[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. *In re Fitzgerald*, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

Art Unit: 1745

“When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.” In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. In re Best, 562 F.2d at 1255, 195 USPQ at 433. See also Titanium Metals Corp. v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). See also In re Ludtke, 441 F.2d 660, 169 USPQ 563 (CCPA 1971); Northam Warren Corp. v. D. F. Newfield Co., 7 F. Supp. 773, 22 USPQ 313 (E.D.N.Y. 1934). See MPEP § 2112.01.

There is a reasonable expectation that the fuel cell, obviated by the combination of references set forth above will effectively operate within the claimed temperature range.

With respect to the power outputs of the cell at an operational temperature of 550° C (claims 15 and 16):

As discussed above, Mogensen teaches that the fuel can be hydrogen. The prior art rejection of record obviates the fuel cell of claim 15. Upon using hydrogen fuel in the cell of the prior art combination above, since the composition of the fuel cell and the fuel used are the same as the instant claim, the prior art of record will generate the same power output when operated at a temperature of about 550° C.

A claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from

Art Unit: 1745

a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See MPEP § 2114, incorporated herein.

***Claim Rejections - 35 USC § 103***

4. Claims 18-20 rejected under 35 U.S.C. 103(a) as being unpatentable over Mogensen in view of EP '356, Weber and Pham-1999 as applied to claims 1-4, 6-7 and 12-17 above, and further in view of U.S. patent No. 5,672,437 (Yajima).

The teachings of Mogensen in view of EP '356, Weber and Pham-1999 have been discussed above, incorporated herein.

The doping material in the ceria of Mogensen can be gadolinium oxide, lanthanide oxide and yttria oxide (col. 4, ll. 1-3 as applied to claim 20).

The differences not yet discussed are of the electrolyte further comprising doped-zirconia (claim 18) and of using a cathode comprising (La,Sr)(Co,Fe) O<sub>3</sub> (claim 19).

With respect to claim 18:

Yajima teaches of solid electrolyte consisting essentially of cerium oxide can be used in place of a stabilized-zirconia electrolyte. However, if the fuel gas fed on its anode's side is H<sub>2</sub>, CH<sub>4</sub> or the like, the cerium oxide contained in the electrolyte may be partially reduced under the effect of the fuel gas at its operating temperature, which can present a problem of a decrease in terminal voltage. The above-mentioned problem can be solved by bonding a thin membrane of stabilized zirconia on the anode's side surface of the cerium oxide electrolyte. Chemical vapor deposition (CVD),

Art Unit: 1745

electrochemical deposition (EVD), thermal spraying and the like have been proposed as a method for forming the thin membrane of stabilized zirconia (col. 1, ll. 19-31).

The bilayered structure represents an electrolyte wherein the cerium oxide has an interfacial region on the anode side surface of ceria and stabilized (doped) zirconia. This prevents partial reduction of the ceria portion of the electrolyte.

The motivation for incorporating doped zirconia to the doped-ceria electrolyte is that it prevents partial reduction of the ceria portion of the electrolyte from the fuel gas.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by further providing doped-zirconia with the doped-ceria of the electrolyte since it would have prevented partial reduction of the ceria portion of the electrolyte from the fuel gas.

With respect to the cathode containing cobalt iron manganese based material (claim 19):

The cathode material is desirably a perovskite structure ( $ABO_3$ ). It is well known in the art to provide air electrodes (cathodes) having a perovskite-like crystal structure of the formula  $ABO_3$ , wherein the A-site comprises a combination of a mixed lanthanide and multiple A-site dopants, and the B-site comprises a combination of Mn and at least one B-site dopant. The mixed lanthanide preferably comprises La, Ce, Pr and, optionally, Nd. The A-site dopants include at least one rare earth element selected from La, Ce, Pr, Nd, Sm, Eu and Gd, and at least one alkaline earth element selected from Ca, Sr and B. The B-site dopant is selected from Mg, Al, Cr, Ni, Co, Fe and



Art Unit: 1745

combinations thereof (see abstract and col. 2, ll. 50-61 of Kuo). Weber further teaches that the perovskite cathode material is selected from combinations of A-site dopants of (La,Sr,Ca) and combinations of B-site dopants of (Cr, Mn, Fe, Co, Ni) (page 5) and that the particular dopant combinations can be adjusted and varied to optimize the thermal coefficient of expansion resulting in delamination at the cathode/electrolyte interface.

Any combination of these materials would have been obvious to one of ordinary skill in the art to while providing a cathode having a coefficient of thermal expansion which closely matches the other components of the fuel cell and decreasing the internal resistance of the fuel cell.

The motivation for using a cathode of La-Sr-Co-Fe-Mn-Oa in a fuel cell is that it would have provided an air cathode of a perovskite crystal structure which decreases the internal resistance of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Mogensen by selecting the cathode material to be La-Sr-Co-Fe-Mn-Oa in a fuel cell since it would have provided a cathode material having coefficient of thermal expansion which closely matches the other components of the fuel cell decreased the internal resistance of the fuel cell. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP j 2144.07.

### ***Conclusion***

Art Unit: 1745

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 5:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (703) 308-2383. Note that these telephone numbers will change around January 1, 2004. At such time the examiners new telephone number will be (571) 272-1283 and the examiner's supervisor's number will be (571) 272-1292. FAX communications should be sent to FAX number: (703) 872-9306. FAXES received after 4 p.m. will not be processed until the following business day. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gregg Cantelmo  
Patent Examiner  
Art Unit 1745

gc



October 13, 2005